EFFECTIVENESS OF MODIFIED SLEEPER STRETCH AND STRENGTHENING EXERCISE TO REDUCE PAIN AND INCREASE THE INTERNAL ROTATION OF SHOULDER JOINT AMONG VOLLYBALL PLAYERS

Registration No.271450225

A **Dissertation submitted to**

THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY

CHENNAI- 600 032

In partial fulfillment of the requirement for the degree of

MASTER OF PHYSIOTHERAPY

ELECTIVE: ADVANCED PHYSIOTHERAPY IN SPORTS.

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Seal & signature of Principal

……..

Prof. R.RADHAKRISHNAN, M.P.T., PGHDM.

Place: Chennai

Date:

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SIGNATURE OF GUIDE

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Mohamed Sathak A.J. College of Physiotherapy

Place: Chennai

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MOHAMED SATHAK A.J. COLLEGE OF PHYSIOTHERAPY

Nungambakkam, Chennai – 600 034.

CERTIFICATE

This is to certify that the project work entitled **"EFFECTIVENESS OF MODIFIED SLEEPER STRETCH AND STRENGTHENING EXERCISE TO REDUCE PAIN AND INCREASE THE INTERNAL ROTATION OF SHOULDER JOINT AMONG VOLLYBALL PLAYERS"** was done by bearing Registration No: 271450225. The undersigned examiner has duly verified and examined the submitted project work done by the above candidate.

INTERNAL EXAMINER: **EXTERNAL EXAMINER**

....

Place: Chennai

Date:

DECLARATION

I hereby present and declare my dissertation titled **"EFFECTIVENESS OF MODIFIED SLEEPER STRETCH AND STRENGTHENING EXERCISE TO REDUCE PAIN AND INCREASE THE INTERNAL ROTATION OF SHOULDER JOINT AMONG VOLLYBALL PLAYERS "** Is the outcome of original research work was undertaken and carried out by me, under the guidance of **Prof Mr. R.Radhakrishnan MPT.PGHDM , at Mohamed Sathak A.J. College of Physiotherapy,** Chennai.32. I also declare that the material of this dissertation has not formed in any way the basis for the award of any other degree previously from The Tamil Nadu Dr. M.G.R Medical University, Chennai-32.

……

Signature of the candidate

Place: Chennai

Date:

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TOPICS

1. ABSTRACT:

Title:

"Effectiveness of modified sleeper stretch with strengthening exercise to reduce pain and increase the internal rotation of shoulder joint among volleyball players".

Background :

The volleyball players need pain free and muscular strength for their playing games. The stretching and strengthening exercise for high school male volleyball players is important to maintain healthy body and it will improve the playing level.

Objectives :

To assess the effects of modified sleeper stretch and strengthening exercise to reduce pain and increase internal rotation of shoulder joint among volleyball players performance among male high school students.

Methods :

Asymptomatic subjects 20 male athlete participated in the study. The control group (n-10) is only for screening and experimental group (n-10) underwent stretch and strengthening exercise.

Shoulder internal rotation ROM, with the arm abducted to 90 degree and scapula prevented, was measured before and after 6 weeks intervention period. while subjects in the experimental group were asked to perform stretching exercise with strengthening exercise on the more limited side only, once daily for 3 repitations ,holding each stretch for 30 seconds and

Results:

The improvements in internal rotation for the subjects in the experimental group were significantly greater than for the subjects in the control group.

Conclussion :

The modified sleeper stretch with strengthening exercise in individual with limited pain and shoulder internal rotation ROM appears to be more effective than no stretching in control without internal rotational asymmetry to improve shoulder internal rotation ROM.

Keyword: Internal rotation of shoulder tightness, Stretching, Strengthening exercise, Overhead athlete.

2. INTRODUCTION

Attaining excellence is the ideal goal of every human being in each of his/her activities.The history pages of all the winners are written with the hands of perfection, self satisfaction,hard work and excellence. To achieve all these capacities and to become a winner it is essential to minimize the errors that can occur hen proceeding towards the goal.

Volleyball is a complex discipline with high technical, tactical, and athletic demands on the players, because of this there is a need for the players to specialize early in certain tasks in the game, such as spiking or setting. Setting is the way in which the ball is hit with the fingertips, the wrist being radially deviated, and hyper extended. In spiking, the player hits the ball at the maximum height of a vertical jump, directing the hit downwards on the ball so that the ball cannot be returned. Because of the repetitive load due to overhead motions, a range of pathologies can cause shoulder pain in the volleyball players.

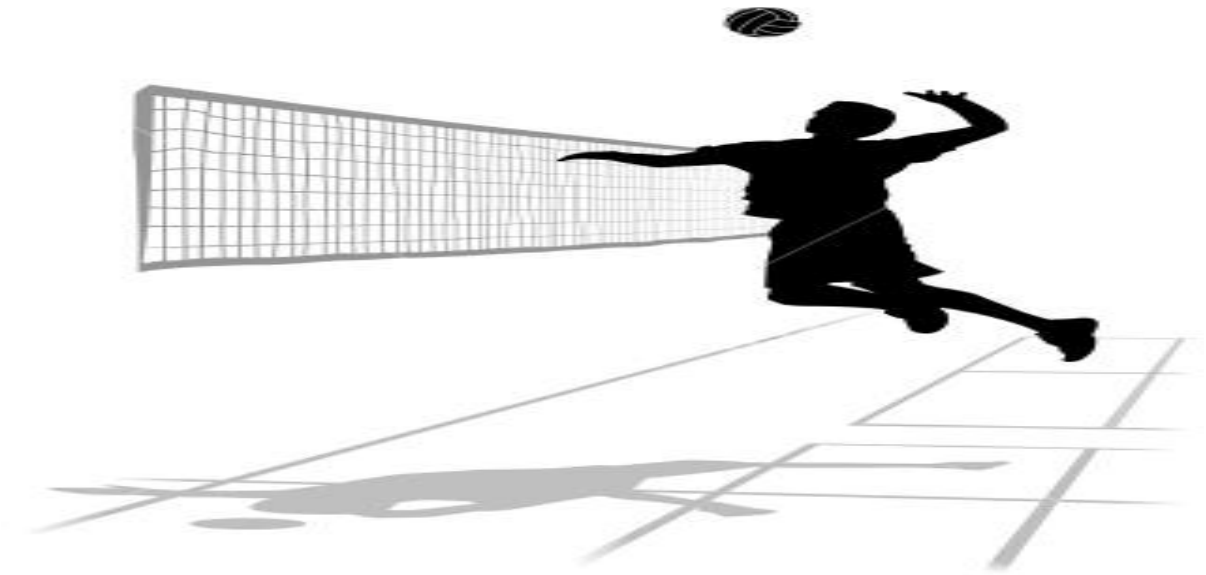
Shoulder injuries accounts for 8-20% of all volleyball injuries. According to **Reeser**, 2006, an elite athlete performs more than 40,000 spikes in a season. This results in a higher risk for developing shoulder pain for the attacker, also seen in other overhead sports including baseball or tennis, as reported by many investigators.

It is imperative to understand normal and abnormal mobility adaptations in the healthy throwing shoulder in order to help to interpret findings on the clinical examination identify the shoulder at risk for injury and develop appropriate preventive & rehabilitative strategies for the throwing athlete 4. One area among researchers that has received particular attention in volleyball players is the flexibility of posterior shoulder joint capsule and musculature.

The posterior shoulder tightness may contribute to alteration in ROM such as reduced internal rotation, horizontal adduction and increased external rotation. These alterations have been linked empirically to bony and soft tissue adaptations that result from the large rotational and distractive forces acting on the GH joint during the throwing motion. Bony adaptations among throwing athletes often appear as increased humeral retroversion[6], this increase has been reported to decrease shoulder internal rotation and increase external rotation, leaving the total arc of motion same (sum of total internal and external rotation.

The deceleration phase of the throwing motion is a major contributor to the development of posterior shoulder soft tissue tightness, as the humerus internally rotates during the follow-through phase of throwing motion; the posterior inferior capsule may be placed in a primary location to resist the deceleration phase, becoming direct restraints against these loads. Accumulation of such forces may result in tightness of the posterior capsule and other dynamic restrainslike posterior deltoid, teres minor, and latissmusdorsi, which causes altered range of motion.

The overhead throwing athlete's range-of-motion (ROM) characteristics have been well described in the literature as having an increase in external rotation (ER) and a decrease in internal rotation (IR) in the throwing shoulder compared to the nonthrowing shoulder**.Wilk et** al25 have described the concept of "total range of motion" (TROM) of the shoulder, which states that the sum of ER and IR ROMof the throwing shoulder should be within 5° of that of the opposite, nonthrowing shoulder in the overhead athlete. Wilk et al23 reported that the passive ROM of the dominant shoulder in 369 professional baseball pitchers, when measured at 90° of shoulder abduction, was 132° of ER and 52° of IR. Although a shift in motion was noted, with the dominant shoulder having an increase in ER ROM and a resultant loss in IR ROM, no significant side-to-side difference in TROM was noted in that population.



In many populations, the imbalance in flexibility might not impair day-to-day functioning, but for overhead athlete, like volleyball player, inflexibility poses major problems. Given the

strong association between posterior shoulder tightness and various upper extremity injuries, many stretching techniques to improve posterior shoulder structures have been used among athletes using overhead throwing.

This study was designed to assess the effectiveness of modified sleeper stretch with strengthening exercise program in the treatmentto reduced pain and increased posterior internal rotation of shoulder joint.

3. NEED FOR THE STUDY

Posterior internal rotation tightness occurs in several sports, with overhead throwing athletesbeing the most susceptible. This is one of the recurrent condition that can severely limit or even end anathletic career, and recovery from each episode can be prolonged. The prevalence of internal rotation tightness was foundto be 30-40% in elite volleyball players.

The purpose of the study is to find effectiveness of modified sleeper stretch with strenghthening exercise in the treatment of decreased internal rotation of shoulder joint among volleyball players.

4. AIM OF THE STUDY

The aim of the study is to find the effectiveness of modified sleeper stretch withstrengthening exercise to reduce pain and increased internal rotation of shoulder joint among volleyball players.

5. OBJECTIVES OF THE STUDY

To reduce the pain

To improve the posterior internal rotation

6. HYPOTHESIS OF THE STUDY

NULL HYPITHESIS

There will be no signifigant improvement by giving modified sleeper stretch with strengthening exercise among volleyball players.

ALTERNATIVE HYPOTHESIS

There will be signifigant improvement by giving modified sleeper stretch with strengthening exercise among volleyball players.

7. REVIEW OF LITERATURE

1. BURKHART et al the effectsof this sleeper stretch improving shoulder range of motion in overhead athletes.

2. TYLER et al reported that the cross body stretch is improved in shoulder range of motion in overhead athletes.

3. JOHNSON et al described astretching technique that was similar to the sleeper stretches used in our findings.

4.CANDIE P.SCHUCKER et al the effects of stretches are very beneficial to overhead athletes and can be performed during an on the field warm up session.

5. MANSKE et al the reported that combing horizontal adduction stretching exercise with posteriorly directed glenohumeral joint mobilization techniques increased shoulder internal rotation.

6. WILK et al reported a correlation between shoulder injuries and TROM deficits in professional baseball pitchers.

7. MCCLURE et al reported that individuals who performed the cross body stretch improved better than who performed the sleeper stretch which is contracdictory to our findings.

8. A KUGLER et al the effect of muscular imbalance and shoulder pain in volleyball attackers.

9. DANIEL S. LORENZ has suggested a study the importance of the posterior capsule of the shoulder in overhead athletes.

10. COOLES et al these result suggested that stretching and joint mobilization may be easy yet effective way to help prevent the development of pathologies of related to posterior shoulder tightness..

11. JOHNNES YDE AND JORN JENSEN. Et al says that Suggests the need to enhance prophylactic measures with regard to blockingand overhand pass techniques, in order to reduce the number and extent of ankle andhand/finger injuries. Volley ball injuries presenting in casualty ; a prospective study. BrjSports Med; 29; 200-204.

12. MAYHEW JL (1972), FURNICH RM, ELLISON AE, ANDREASSON et al.,
A mechanical property of tape has suggested that has two functions: one is supporting and decreasing the passive instability of a joint and the other is enhancing the active stability. This achieved by skin receptors facilitating signals from the intramuscular and joint receptors.

13. MC CORMACK HM, HORNE DJ, et al visual analog scale (VAS) provide a simple technique for measuring subjectiveexperience and have been established as valid and reliable in a range of clinical andresearch application.

14. BONICA J J (1990) et al visual analog scale is a quick and accurate scale by means of which patients can ratetheir pain. Having a sense of control despite experiencing chronic pain has a positiveeffect on patients coping abilities, patients perception of the control they have over pain.may be possible by using visual analog scale.

15. VARNI et al., (1987) VASs provide valid and reliable pain measurements and correlate highly with patients with disorders.

8. METHODOLOGY

8.1 STUDY DESIGN

Experimental study design

8.2 SAMPLE DESIGN:

The purposive sampling technique was adapted based on the following inclusion and exclusion criteria.

8.3 SAMPLE SIZE:

The subjects were randomly selected 20 students.

Each group consist 20 subjects

Experimental group (A) – 10 by using sleeper stretch and strengthening exercise.

Control group (B) – 10 by using general warm up exercise.

8.4 STUDY DURATION

Study duration 6 weeks.

8.5 STUDY SETUP

The study setup community based school and clinic.

8.6 INCLUSION CRITERIA

- Pain limit sports function
- Pain on palpation
- Male population
- Age group between `14 – 18 years
- Symptoms on body posture
- Reduced ROM.

8.7 EXCLUSION CRITERIA

- Acute / chronic injuries
- Fracture (or) any dislocation at the site
- Any inflammation / infections joints
- Underwent any recent surgeries
- Neurological and Psychological disorders

8.8 VARIABLES:

Independent variables:

Sleeper stretch with strengthening exercise

Dependent variables:

- Pain
- Increased ROM

8.9 MATERIALS USED

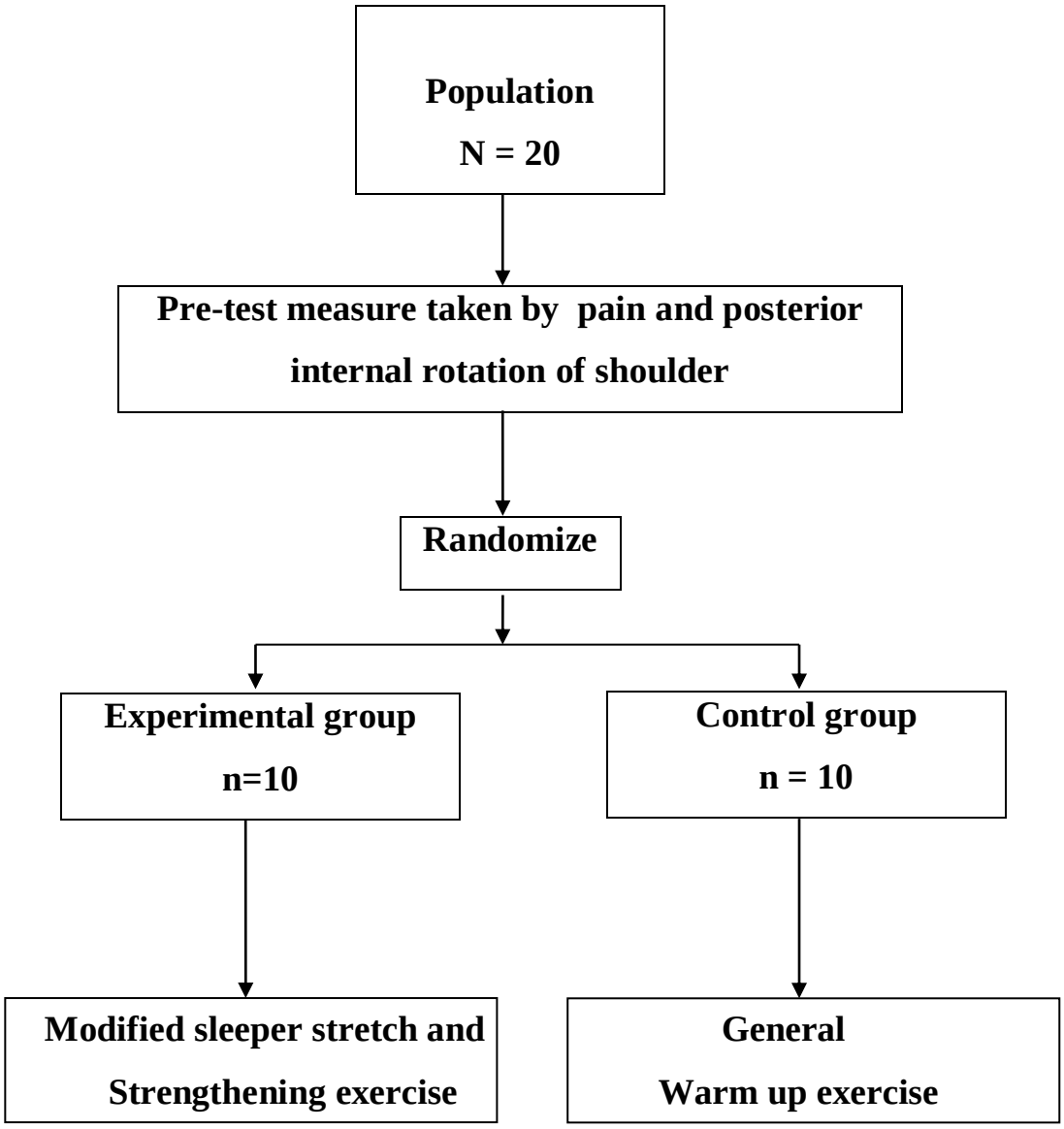
- Couch
- Pillow
- Weight
- Resistance band
- Towel
- Goniometer.

8.10 OUTCOME MEASURES :

VAS scale: Visual analogue scale was used to measure the severity of pain response in patient experience it consist of a 10 cm horizontal line with ends labeled to pain (10) and severe pain (10). The patients mark on the line corresponding to severity of pain, which they experience.

GONIOMETER : Goniometer was used to measure the range of motion response in patient experience. The patients mark on the line corresponding to range of motion, which they experience.

9. PROCEDURES FLOW CHART



9.1 ASSESSMENT PROCEDURE

The 20 patients were selected in the study, based on the inclusion and exclusion criteria. Theywere divided into two groups- experimental group and control group with 10 patients in eachgroup. The experimental group received modified sleeper stretch with strengtheningand exercise control group received only warmup exercise the patients..The pre-test measurement takes from VAS scale and range of motion goniometer.

9.2.PROCEDURE OUTCOMES;

9.2.1.STRETCHING:

1.Modified sleeper stretch:

- Patient position:

Side lying

- Therapist position:

Walk standing

- Procedure:

A) The athlete is slightly rotated posteriorly (20 – 30) posterior to the coronal plane of the body) to place the shoulder in the scapular plane as passive internal rotation is performed.

B) This position stabilizes the scapula without causing subacromial impingement complaints.

C) The Stretch once a daily 3 times and held for 30 seconds.

(a) Modified Sleeper stretch

2. Modified cross- body stretch:

- Patient position:

  Supine lying**.**

- Therapist position:

Walk standing.

- Procedure:

The athlete stabilizes the scapula against the table as the shoulder is horizontally adducted, while external rotation is restricted via counter pressure of the opposite forearm.The stretch once a day daily 3 times and held for 30 seconds.

(b) Modified Body cross stretch

9.2.2. STRENGTHENING EXERCISE

(c) Rotator cuff muscles

(d) Prone Blackburn exercise

(e) Punching type exercise for Serratus anterior

(f) subscapularis muscle exercise

10. DATA ANALYSIS

Statistical method

T – Test

The t – test assassass whether the means of two groups are statistically different from each other. This analysis is appropriate whenever you want to compare the means of two groups and especially appropriate as the analysis for the post test only two – groups randomized experimental design

This leads us to avery important conclusion: when we are looking for the differences between scores for two groups, we have to judge the difference between their meeans relative to the spread or variability of their scores.

TABLE-1

PAIN in [VAS]							
		MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	T - VALUE	P - VALUE	SIGNIFICANCE
GROUP - A CONTROL GROUP	PRE - TEST	4.10	0.30	0.83	0.053786248	4.06E-02	P < 0.1 At 99.9% Confidence Level is highly significant
	POST – TEST	3.80					
GROUP - B EXPERIMENTAL GROUP	PRE - TEST	4.20	2.60	1.48	0.57978545	7.02E-08	P < 0.01 At 99.9% Confidence Level is very highly significant
	POST – TEST	1.60					

TABLE -2

INTERNAL ROTATION OF SHOULDER JOINT [GONIOMETER]							
		MEAN	MEAN DIFFERENCE	STANDARD DEVIATION	T - VALUE	P - VALUE	SIGNIFICANCE
GROUP - A CONTROL GROUP	PRE - TEST	44.50	2.00	4.26	0.031087661	1.84E-02	P < 0.1 At 99.9 % Confidence Level is significant
	POST - TEST	46.50					
GROUP - B EXPERIMENTAL GROUP	PRE - TEST	47.00	16.00	9.73	0.203656973	3.02E-06	P < 0.01 At 99.9% Confidence Level is very highly significant
	POST - TEST	63.00					

TABLE-3

Result of Pain Analysis in VAS		
	GROUP - A CONTROL GROUP	**GROUP - B EXPERIMENTAL GROUP**
t- VALUE	**0.053786248**	**0.579785450**
P- VALUE	**0.040563094**	**7.02454E-08**
SIGNIFICANCE	**P < 0.1**	**P < 0.01**
RESULT	Ho: IS REJECTED	Ho: IS REJECTED
	H1: IS ACCEPTED	**H1: IS ACCEPTED**
Ho = 0 i.e NO DIFFERENCE BETWEEN PRE-TEST and POST-TEST		
H1 ≠ 0 i.e DIFFERENCE BETWEEN PRE-TEST and POST-TEST		
GROUP-B EXPERIMENTAL GROUP IS Highly Significant than GROUP-A CONTROL GROUP		

BAR DIAGRAM-1

EFFECTIVENESS OF MODIFIED SLEEPER STRETCH AND STRENGTHENING EXERCISE

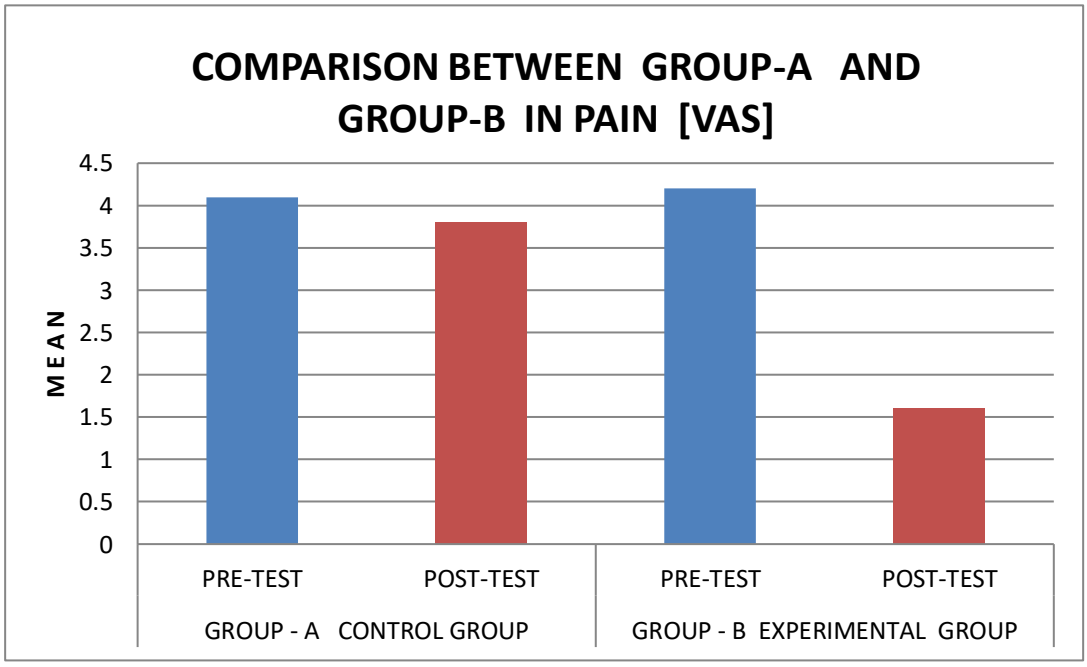
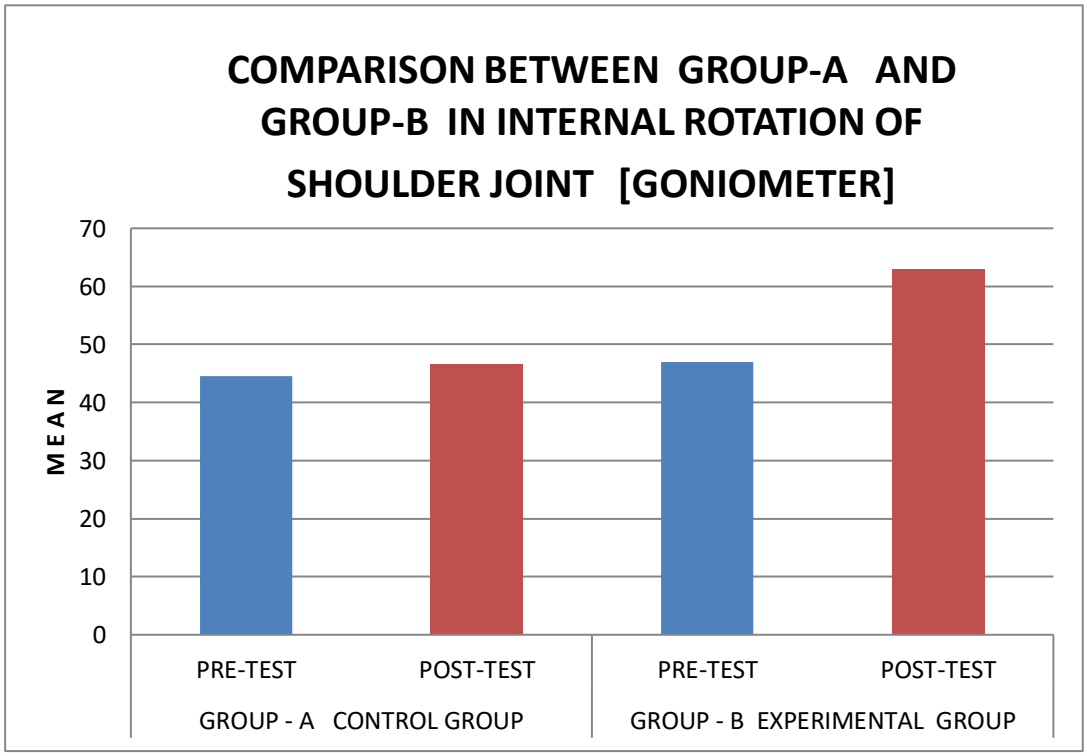


TABLE-4

Result of INTERNAL ROTATION OF SHOULDER JOINT [GONIOMETER] analysis		
	GROUP - A CONTROL GROUP	**GROUP - B EXPERIMENTAL GROUP**
t- VALUE	**0.031087661**	**0.203656973**
P- VALUE	**0.018393749**	**3.02296E-06**
SIGNIFICANCE	**P < 1**	**P < 0.01**
RESULT	Ho: IS REJECTED	Ho: IS REJECTED
	H1: IS ACCEPTED	**H1: IS ACCEPTED**
Ho = 0 i.e NO DIFFERENCE BETWEEN PRE-TEST and POST-TEST		
H1 ≠ 0 i.e DIFFERENCE BETWEEN PRE-TEST and POST-TEST		
GROUP-B EXPERIMENTAL GROUP IS Highly Significant than GROUP-A CONTROL GROUP		

BAR DIAGRAM-2
EFFECTIVENESS OF MODIFIED SLEEPER STRETCH AND STRENGTHENING EXERCISE



11. RESULT

According to t – test the difference in reduce the pain and increased in internal rotation o f shoulder joint was statistically significant.Table shows the difference in the pain and internal rotation of shoulder for both experimental and control groups.

The participants within the control group mean(10) p-valve in pain 0.040563094 and goniometer0.018393749.

The participants of the experimental group mean(10) p-valve in pain 7.02454E-08 and goniometer3.02296E-06.

T-Test was done for the pre and post test of pain reduce in control group $p<0.1$ significance 7.31% and pain reduce in experimental group $p<0.01$ significance 61.90%. The difference between control and experimental group 55.9%. The experimental group is highly significant than control group.

T-Test was done for the pre and post test of shoulder internal rotation in control group $p<01$significance 4.49% and shoulder internal rotation in experimental group $p<0.001$ significance 34.04%.The difference between control and experimental group 29.5%. The experimental group is highly significant than control group.

12. DISCUSSION

The result of this study was to explain that subjects with reduce pain and increased internal rotation shoulder joint by giving modified sleeper stretch and strengthening exercise for volleyball players in high school students.There is significant improvement to reduced pain and increasedbinternal rotation of shoulder joint of male volleyball players hence I rejected the null hypothesis.

Subjects had little knowledge and experience with stretching and completed an 6-weeks strengthening exercises.The data were analyzedto determine strengthening execis protocol has better improved in internal rotation of shoulder in over head athletes.

In the present study , age group participated was between 14 – 18 years.20 subjects were selected who fulfilled the predetermined inclusive and exclusive criteria.The subjects werendividednto groups, 10 in each group. Control group underwent only screening and experimental group underwent modified sleeper stretch and strengthening exercise.

Statistical analysis using unpaired test showed that there was significant difference between two groups in improving thr performance in volleyball players.The paired t -test concluded that there was a significant improvement in modified sleeper stretch and strengthening exercise in experimental group, which was supported by studies as follows. This study control group individuals in volleyball players.

The result from this study helps the therapist to decide the stretch with strengthening exercise improving the pain and shoulder internal rotation.

13. LIMITATIONS AND RECOMMENDATION

Limitations:

Limitations of this study include:

1. Students may not be able to attend all the treatment sessions.
2. The study may be affected by injuries while treatment or dropout due to illness.
3. The students may be motivated to perform the activities and coporate the treatment sessions or tests as specified bhy the researcher.
4. The participants are part of a convenience sample from intact stretching and strengthening treatment programs.

Recommendations:

1. Future study is recommended in large sample size .
2. Follow up studies can be performed to understand about long term effects of the exercise.
3. It can also be extended to players of other events to find out whetever it can be effectively used in enhancing performance in them.

14. CONCLUSION

This study investigated the effectiveness of modified sleeper stretch with strengthening exercise to reduced pain and increased internal rotation of shoulder joint among volleyball players.The experimental groups reduced pain and increased internal rotation of shoulder joint from the pre-test to the post-test with in six weeks.

The findings from this study have generated new ideas that could be of interest toindividuals involved in athletics, training, physical education, and in sports who require volleyball players.

Also, this study only looked at females between the 14 years and 18years of age. It could also be of interest to examine other age groups within a different regional setting to determine if the treatment protocols will produce a significant change in volleyball players.

Lastly, the length of the current study was only six weeks treatment sessions. It would be of interest to see the minimum number of weeks that would induce a significant change in the pain and internal rotation of shoulder joint improvement based on the training program of participants. This information might help professionals reduce injury among the population they are working with by shortening the treatment sessions along with helping physical educators improve their students performance in class.

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APPENDIX

APPENDIX I

INFORMED CONSENT LETTER

Modified sleeper stretch with Strengthening exercise Methods on Volleyball players

CONSENT FORM

This is to certify that I _____age _____freely and voluntarily agreed to participate in the study "EFFECTIVENESS OF MODIFIED SLEEPER STRETCH WITH STRENGTHENING EXERCISE TO REDUCE PAIN AND INCREASE INTERNAL ROTATION OF SHOULDER JOINT AMONG VOLLYBALL PLAYERS. He/she has been explained about the procedures and the benefits and risk that would occur during the study on all the information given by me will be kept strictly confidential and used for research purpose.

Participant:

Parents:

Date:

I have explained and defined the procedure to which the subject has consented to participate.

Researcher:

Date:

APPENDIX II

SUBJECTIVE EXAMINATION

Name:

Age:

Sex:

History of present illness:

Past medical history:

OBJECTIVE EXAMINATION:

ON OBSERVATION:

Swelling:

Posture:

Gait:

Deformity:

Expression:

Attitude:

ON PALPATION:

Warmth:

Tenderness:

ON EXAMINATION:

Musculoskeletal examination:

Range of motion:

Region	Active ROM		Passive ROM	
	Right	Left	Right	Left

Muscle power:

Muscle flexibility – Sit and reach test

Balance analysis:

Functional reach test

Gait analysis:

Posture analysis:

TRAINIG PROGRAM:

MASTER CHARTS

MASTERCHART - 1

CONTROL GROUP

PAIN (VAS)

S.No	Pre test value	Post test value
1	5	4
2	3	3
3	4	4
4	5	5
5	3	3
6	4	3
7	5	4
8	5	5
9	3	3
10	4	4

MASTER CHART - 2

EXPERIMENTAL GROUP

PAIN (VAS)

S.No	Pre test value	Post test value
1	5	2
2	3	1
3	4	2
4	4	1
5	5	2
6	4	2
7	3	1
8	5	2
9	4	1
10	5	2

MASTER CHART - 3

CONTROL GROUP

GONIOMETER (ROM)

S.No	Pre test value	Post test value
1	40°	45°
2	50°	50°
3	45°	40°
4	50°	50°
5	40°	40°
6	40°	45°
7	45°	40°
8	50°	55°
9	45°	45°
10	40°	45°

MASTER CHART - 4

EXPERIMENTAL GROUP

GONIOMETER (ROM)

S.No	Pre test value	Post test value
1	40^{o}	55^{o}
2	50^{o}	60^{o}
3	55^{o}	70^{o}
4	40^{o}	60^{o}
5	45^{o}	65^{o}
6	50^{o}	65^{o}
7	40^{o}	60^{o}
8	50^{o}	65^{o}
9	45^{o}	60^{o}
10	55^{o}	70^{o}